WE CLAIM:

1. A positioning device for precisely positioning a microtiter plate on a support, wherein the positioning device comprises at least a first alignment member that is positioned to contact an inner wall of the microtiter plate when the microtiter plate is in a desired position on the support.

2. The positioning device of claim 1, wherein two or more alignment members are positioned to contact a single inner wall of the microtiter plate when the microtiter plate is in the desired position on the support.

3. The positioning device of claim 1, wherein the positioning device further comprises at least a second alignment member that is positioned to contact a second wall of the microtiter plate when the microtiter plate is in the desired position on the support.

4. The positioning device of claim 3, wherein the second wall of the microtiter plate is an inner wall.

5. The positioning device of claim 4, wherein the first inner wall and the second inner wall form a right angle.

6. The positioning device of claim 4, wherein two or more alignment members are positioned to contact the first inner wall of the microtiter plate, and at least a third alignment member is positioned to contact the second inner wall, when the microtiter plate is in the desired position on the support.

7. The positioning device of claim 1, wherein one or more of the alignment members comprises a curved surface that contacts the inner wall of the microtiter plate.

8. The positioning device of claim 7, wherein one or more of the alignment members comprises a locating pin.

9. The positioning device of claim 1, which further comprises a pusher that can move a microtiter plate in a first direction to bring a first inner wall of the microtiter plate into contact with one or more of the alignment members.

10. The positioning device of claim 9, wherein the positioning device comprises a second pusher that can move the microtiter plate in a second direction to bring a second inner wall of the microtiter plate into contact with one or more of the alignment members.

11. The positioning device of claim 10, wherein the device comprises two alignment members that are in contact with the first inner wall of a microtiter plate when the microtiter plate is in a desired position.

12. The positioning device of claim 1, wherein the positioning device comprises a retaining device which retains the microtiter plate in the desired position on the support.

13. The positioning device of claim 12, wherein the retaining device comprises a vacuum plate.

14. A retaining device for retaining a microtiter plate in a desired position on a support, wherein the retaining device comprises a vacuum plate which, when a vacuum is applied, holds the microtiter plate in the desired position.

15. The retaining device of claim 14, wherein the vacuum plate is connected to a vacuum source.

16. The retaining device of claim 14, wherein the vacuum plate comprises an interior surface and a lip surface, with the interior surface being recessed relative to the lip surface.

17. The retaining device of claim 16, wherein the depth at which the interior surface is recessed is between 0.001 inches and 0.01 inches.

18. The retaining device of claim 16, wherein a support matrix approximately as thick as the depth at which the interior surface is recessed is present on the interior surface to prevent distortion of the microtiter plate when a vacuum is applied.

19. The retaining device of claim 14, wherein the device comprises a vacuum-actuated switch that, when the microtiter plate forms an airtight seal with the vacuum plate, generates a signal that the microtiter plate is properly positioned.

20. The retaining device of claim 19, wherein the signal notifies a controller that the microtiter plate is ready for further processing.

21. An object holder for precisely positioning an object on a support, wherein the object holder comprises:

a first pusher for moving the object in a first direction so that a first alignment surface of the object contacts a first set of one or more alignment members; and

a second pusher for moving the object in a second direction so that a second alignment surface of the object contacts a second set of one or more alignment members; wherein

wherein the first pusher comprises a lever pivoting about a pivot point.

22. The object holder of claim 21, wherein the lever is operably attached to a spring which causes the pusher to apply a constant force to the object in order to move the object in the first direction against the first set of alignment members.

23. The object holder of claim 21, wherein the first pusher comprises a low friction contact point which contacts the object, thus facilitating movement of the object in the second direction by the second pusher.

24. The object holder of claim 23, wherein the low friction contact point is a roller.

25. The object holder of claim 21, wherein the object is a microtiter plate.

26. The object holder of claim 25, wherein either or both of the first alignment surface and the second alignment surface is an inner wall of the microtiter plate.

27. The object holder of claim 21, wherein the object holder comprises one or more sensors that detect the position of one or more of the pushers, thereby determining whether the object is in a desired position.

28. The object holder of claim 21, wherein the object holder comprises a controller that first directs the first pusher to move the object in a first direction, then directs the second pusher to move the object in a second direction, and subsequently directs a retaining device to be activated.

29. An automated system for performing high-throughput assays or reactions in microtiter plates, wherein the automated system comprises a positioning device of claim 1.

30. The automated system of claim 29, wherein the automated system comprises a robotic device for placing a microtiter plate on the positioning device.

31. The automated system of claim 29, wherein the automated system comprises a liquid dispenser which can deposit reagents in wells of a microtiter plate.

32. An automated system for performing high-throughput assays or reactions in microtiter plates, wherein the automated system comprises a retaining device of claim 14.

33. The automated system of claim 32, wherein the automated system comprises a robotic device for placing a microtiter plate on the positioning device.

34. The automated system of claim 32, wherein the automated system comprises a liquid dispenser which can deposit reagents in wells of a microtiter plate.

35. An object holder for receiving and retaining an object in a desired orientation, the object having a first alignment surface and a second alignment surface, the object holder comprising:

a support fixture;

a retaining device on the fixture;

a first alignment member supported on the fixture and positioned to cooperate with the first alignment surface of the object;

a second alignment member supported on the fixture and positioned to cooperate with the second alignment surface of the object;

a first pusher supported on the fixture and having a relaxed position and a tensioned position, the first pusher arranged to cooperate with the object to move the first alignment surface of the object firmly against the first alignment member as the first pusher is moved from the relaxed position to the tensioned position;

a second pusher supported on the fixture and having a relaxed position and a tensioned position, the second pusher arranged to cooperate with the object to move the second alignment surface of the plate firmly against the second alignment member as the second pusher is moved from the relaxed position to the tensioned position;

a controller operably connected to the retaining device, the first pusher, and the second pusher, and

wherein the controller directs the first pusher to its tensioned position, directs the second pusher to its tensioned position, and directs the clamp to be activated, so that the object is retained in the object holder in a desired orientation.

36. The object holder according to claim 35, wherein the object is a microtiter plate.

37. The object holder according to claim 36, wherein the retaining device is a vacuum plate connected to a vacuum source.

38. The object holder according to claim 37, wherein the object is a microtiter plate that has a well area, and the vacuum plate cooperates with a bottom of the well area to securely hold the plate.

39. A method of receiving and retaining an object in a desired orientation, the object having a first alignment surface and a second alignment surface, the method comprising:

placing the first alignment surface of the object loosely adjacent a first alignment member, and placing the second alignment surface of the object loosely adjacent a second alignment member;

moving a first pusher against the object so that the first alignment surface is held firmly against the first alignment member; and

moving a second pusher against the object so that the second alignment surface is held firmly against the second alignment member.

40. The method of claim 39, wherein the method further comprises verifying that either or both of the first pusher and the second pusher are properly positioned to hold the object against the alignment members.

41. The method of claim 39, wherein the method further comprises activating a retention device that holds the object in the desired orientation.

42. A software program which operates on a controller, wherein the software directs the controller to implement the method of claim 39.